most treasured possessions of the University of Sheffield will always remain the marble bust of Sorby at the entrance to the Firth Hall, and his portrait, which hangs in the council room. So—his "task accomplished and the long day done."

"Beyond the loom of the last lone star, through open darkness hurled
Further than rebel comet dared or hiving star-swarm swirled
Sits he with those that praise our God for that they served His world."

J. O. A.

NOTES.

WE regret to learn at the moment of going to press of the death of Sir John Eliot, K.C.I.E., F.R.S., who until recently was the distinguished head of the Indian Meteorological Service.

AT the anniversary meeting of the Royal Irish Academy on Monday, March 16, the following were elected as honorary members of the academy in the section of science:—Sir Archibald Geikie, K.C.B., F.R.S.; Prof. J. C. Kapteyn, Groningen; Prof. A. A. Michelson, Chicago; Prof. J. D. van der Waals, Amsterdam; and Dr. A. R. Wallace, F.R.S.

IT is understood that provision will be made by the Canadian Government in the estimates for the coming financial year for a grant of 25,000 dollars (5000*l*.) by the Dominion Parliament towards the expenses of the British Association's visit to Winnipeg next year. The city of Winnipeg itself proposes to make a grant of 5000 dollars (1000*l*.). The week of the meeting will probably be from August 25 to September 1, 1909.

A MEMORIAL to the late Sir Leopold McClintock is to be placed in Westminster Abbey, with the consent of the Dean and Chapter. The memorial will consist of an alabaster slab, underneath the monument to Sir John Franklin, whose fate was definitely ascertained by Sir Leopold during his celebrated expedition on board the *Fox*. The inscription will be as follows:—"Here also is commemorated Admiral Sir Leopold McClintock, 1819–1907. Discoverer of the Fate of Franklin in 1859." The expense of the memorial has been undertaken by the Royal Society, the Royal Geographical Society, and Trinity House.

THE Canadian Mining Institute is arranging, in connection with its summer meeting, a general excursion to the mineral districts of Nova Scotia, Quebec, Ontario, and British Columbia, starting towards the end of August next. Members of the Institution of Mining and Metallurgy have been invited to take part in the general excursion (or any part of it) on the same specially favourable conditions as will be accorded to its own members. The Dominion Government, and the various provincial governments concerned, will cooperate in making the excursion a success, and the occasion will afford an excellent opportunity for engineers to inspect the important mineral areas of the Dominion.

THE second International Conference on Sleeping Sickness, to the proceedings of which attention was directed in our issue of last week, has terminated without being able to agree on the draft convention before it. Reuter's Agency states that the French and Italian plenipotentiaries declared themselves unable to accept a proposal, made at the last conference in June and then unanimously recommended, for the establishment of a central bureau in London. It was proposed that the work connected with sleeping sickness should be taken over by a hygiene bureau to be established in Paris, but this proposal the German plenipotentiaries declined to accept, and they strongly supported the British plan for the establishment of a bureau in London. The president (Lord Strathcona), the vice-presidents, and council of the Royal Institute of Public Health gave a dinner on March 11 at the Hôtel Métropole "to meet the delegates of the International Sleeping Sickness Conference." Lord Strathcona presided, and in proposing the health of the delegates to the international conference hoped that the result of that and successive conferences will be, if not to eliminate, at all events to mitigate the great scourge of sleeping sickness. Dr. Koch, in reply, said it is but the duty of medical men to investigate diseases. Especially is this the case with countries which, on account of their colonies, are particularly interested in certain dangerous diseases. Dr. Cureau expressed the thanks of the French delegates. The Marquis de Villalobar, Prof. S. Liquido, Colonel Lantonnois, Dr. Kopke, and Sir Walter Foster also replied.

THE Bakerian lecture of the Royal Society will be delivered on Thursday next, March 26, by Prof. C. H. Lees, F.R.S., upon the subject of the thermal conductivities of solids.

WE have received a copy of the introductory number of *Neue Weltanschauung*, a scientific journal to be published at Stuttgart in monthly parts at fourpence each. It appears that a Neue Weltanschauung Society has been established at Stuttgart which is to issue, not only the monthly journal bearing the same name, but likewise another publication at irregular intervals. We shall be better able to judge of the merits of the former when we receive one of the regular numbers.

IN the March issue of *British Birds* Mr. N. F. Ticehurst records a number of bird-bones obtained by excavating an ancient mound known as the Broch of Ayre, near the Bay of Ayr, in Orkney. The most interesting of these is an imperfect leg-bone of the great auk, a species hitherto unknown from the Orkney mainland. It would, however, remarks the author, be rash to take the evidence of such a specimen as proof that the bird was once an inhabitant of the mainland.

No. 1579 of the Proceedings of the U.S. National Museum contains an interesting account of the mode of collecting the sap of the Mexican agave and manufacturing therefrom the national beverage known as *pulque*. When the agave is in the proper condition some of the leaves are stripped away so as to expose the central core of unfurled leaves; a year later the core is cut out bodily, and a hollow made in the base to serve as a reservoir for the limpid sap, which soon flows from the wound, and is stated to have a taste very like cocoanut-milk. The sap, or *aquamiel*, is drawn off by means of a siphon, and transported in skins to undergo fermentation, and thus be converted into pulque.

WE have been favoured with a reprint of a note published in the *American Naturalist* for December last, in which Mr F. T. Lewis disputes the commonly accepted view that the mimicry among South American butterflies is connected with birds. The original mimicry theory, it is explained, has been so extended as to embrace and account for not only resemblances between an edible and an inedible form, but also between two inedible species. The author now raises the question whether the re-

semblances have anything to do with edibility, or the reverse, and quotes Werner and Weismann to the effect that they have not. One of the arguments used is that, as a general rule, birds do not molest butterflies to any great extent. The real explanation of the resemblances in question will, in the author's opinion, be supplied by a chemical theory of animal coloration.

THE third part of the Bergen's Museum *Aarbog* for 1907 contains a long article by Mr. C. F. Kolderup on Scandinavian glaciation. At the period of greatest extension, it appears that the whole country was covered with an ice-sheet moving in a westerly direction altogether independent of local contours. When, however, the ice began to diminish, the direction of movement gradually became more and more dependent upon that of the valleys, until finally the ice-sheet became resolved into a number of large isolated glaciers filling the latter. Some geologists admit only one great Ice age, and deny the intercalation of a warm period between two such maxima, during which the snow well-nigh disappeared from the Scandinavian highlands. The evidence of the moraines and their embedded shells is, however, in the author's opinion, amply sufficient to justify belief in such an intercalation. Indeed, the occurrence of several oscillations of level, with concomitant climatic changes, appears to be demonstrated.

THE Cotteswold Naturalists' Field Club has recently issued in part i. of its sixteenth volume a paper by Dr. C. G. Cullis and Mr. L. Richardson on the Old Red Sandstone conglomerate of the Forest of Dean, in which gold has undoubtedly been detected. A comparison with the "banket" beds of the Rand is made, favourable to the Forest of Dean so far as convenience in working goes; but the authors do not commit themselves as to the average gold-contents of the British deposit. The same part contains several papers on local geology, and a finely illustrated account of species of the terebratuloid genus Cincta, by Mr. S. S. Buckman. *Terebratula numismalis* here finds itself split up into a number of species of Quenstedt's genus Cincta, which has priority over several other names.

THE fourth part of vol. xx. of the Proceedings of the Geologists' Association (January, 1908, price 3*s*.) consists of a complete memoir by Dr. A. W. Rowe on the zones of the White Chalk of the Isle of Wight, with an index that includes all places and fossil species mentioned in this and in the four memoirs that have preceded it. Mr. C. D. Sherborn, who has often collaborated in this great zonal work, supplies coloured maps on a large scale, and the photographic illustrations are of extraordinary delicacy and beauty. Dr. Rowe's twelve years' labour is here brought worthily to a conclusion, and the necessity of accurate zonal collection, if one would study any sequence of fossil forms, is again set clearly before the reader. The true course of invertebrate evolution can, after all, be traced only by the painstaking methods of field observation inaugurated by William Smith at the close of the eighteenth century.

IN the *Bolletino* of the Italian Seismological Society Prof. Mario Baratta gives a detailed account of the methods of construction adopted in re-building the Calabrian villages destroyed in the earthquake of September 8, 1905. Frame buildings in wood, filled in with masonry or concrete, were largely adopted, and armoured concrete for the more important buildings. The report would have been of greater interest had it contained an account of the behaviour of these erections in the earthquake of October 23, 1907, which was said, in the daily newspapers, to have destroyed some of the newly built villages.

WE have received an advance copy of a paper by Dr. E. Oddone, to be published in the *Bolletino della Societa Sismologica Italiana*, in which he makes the suggestion, already put forward by Prof. Milne in the last report of the British Association committee on seismological investigations, regarding the possibility of a causal connection between the two earthquakes on August 16, 1906, which occurred within about thirty-two minutes of each other, one in the northern Pacific, the other in Chile. This interval being approximately that which the wave motion of the second phase might be expected to take in travelling from the origin of the one earthquake to that of the other, it is suggested that the arrival of these waves was the determining cause of the time of occurrence of the Valparaiso earthquake. An objection to the acceptance of this suggestion is the uncertainty as to whether the second-phase waves are not extinguished before reaching a distance of 120° from the origin, that is to say, somewhat less than the distance separating the origins of the two earthquakes in question.

THE Queensland Geological Survey has issued a Bulletin (No. 216), by Mr. B. Dunstan, on the Great Fitzroy copper and gold mine, Mount Chalmers, Rockhampton district. The ore deposits, which have been known since 1860, occur in quartzite, which appears to be the result of the alteration of limestone. It is estimated that there is about 145,000 tons of ore still available, containing 4½ per cent. of copper, 3½ dwt. of gold per ton, and 1 ounce of silver per ton.

THE weathering of coal forms the subject of an investigation by Prof. S. W. Parr and Mr. N. D. Hamilton (University of Illinois, Bulletin No. 17). They find that an exudation of combustible gases from coal occurs from the time of breaking out of the sample from the seam, and that an absorption of oxygen accompanies the exudation. The process of deterioration is probably due to oxidation of hydrogen or of hydrocarbons. It may also be due to a simple loss of combustible gases and their replacement by oxygen. The extent of the deterioration varies with different coals, but the deterioration is probably most active during the first two or three weeks from the taking of the sample.

AN interesting monograph on the rural highways of Wisconsin, by Mr. W. O. Hotchkiss, has been issued (Bulletin No. 18) by the Wisconsin Geological and Natural History Survey. It covers 136 pages, and is illustrated by sixteen plates. The improvement of the rural highways of the State is a matter to which much attention has been devoted, and the author supplies useful information regarding methods of road construction. He gives a summary of the general principles of making roads, and discusses the conditions obtaining in the State of Wisconsin. In conclusion, he adds a digest of the laws of those States where legislation in the matter of roads has received most careful attention.

IN comparison with the thorough treatment of bridge trusses by eminent writers, very little attention has been devoted to roof trusses, and consequently the exhaustive study described by Dr. N. Clifford Ricker in the University of Illinois Bulletin, No. 16, forms a valuable addition to technical literature. The investigation had for its original object the determination of a formula for the weight of roof trusses more accurate than those in existence. Other

interesting results were incidentally obtained, and the Bulletin gives in detail the results obtained in reference to the formulæ for normal wind pressure, the system of calculation and design, the form of stress sheet, the formula for weight of truss, the comparative weights of trusses of various materials, the economical distance between trusses, length of panels and number of purlins per panel, the effect of raising the lower chord at the centre of span (from which no advantage results), and the most economical ratio of rise to span of roof trusses.

WE have received parts i. and ii. of the meteorological report of the Survey Department of Egypt for the year 1905. Part i. contains very complete hourly readings and means for each month at Helwan Observatory. Attention is directed to the well-marked daily and annual variations of wind direction and to its prevalence to the east of north, whereas in the Delta it is usually west of north. Part ii. deals with climatological stations, rainfall, and river-gauge observations in Egypt and the Sudan. The annual rainfall was in excess in the Delta and in the Sudan, but deficient in the Cairo district and over middle Egypt. The Nile flood did not reach its mean level at any time during the year.

A DISCUSSION by Prof. J. Schneider of the moon's influence on the wind components at Hamburg is published in vol. xxx. (1907) of *Aus dem Archiv der deutschen Seewarte*. As the work was undertaken principally with the view of ascertaining whether any daily or half-daily influence was exhibited, only the observations for the six winter months, 1887–1896, were used, so that the influence of the sun might be eliminated as much as possible. Among the various results, we note that from the records of the best anemometers the moon's influence is shown to be practically imperceptible in the daily range; the results for anomalistic months show that both components (W.-E. and S.-N.) apparently increase with the approach of the moon to the earth, and decrease as it recedes. The values are tabulated in various ways; for details we must refer to the paper in question.

IN the Bulletin of the Manila Weather Bureau for March, 1907, Father Algué gives an account of a typhoon of extraordinary intensity which visited the Caroline Islands in that month. The storm apparently formed to the south of Ponape (Eastern Carolines) between March 24 and 26, and moved in a W.N.W. direction to Wlea (Western Carolines), where it arrived on the morning of March 29; by the afternoon of March 30 it reached Mackenzie Island (lat. 10° N., long. 140° E.), when it began to re-curve to the N. and E., passing to the N. of the Ladrones Islands (lat. 20° N., long. 145° E.) on the evening of April 3. In the Wlea group the destruction was almost complete; immense waves carried away houses and everything in their path, and some 200 persons perished on two of the islands. At 7h. 30m. a.m. on March 29 the barometer there read 28·58 inches, and fell rapidly to 27·24 inches at 10h. a.m.; at 4h. p.m. it had risen to 29·10 inches. The wind blew with typhoon force from N.N.E. and N.E. from 3h. a.m. to 10h. a.m., and then shifted to S.E. and S.W., and was still blowing a hurricane from S.S.E. at 8h. p.m. The influence of the storm was not felt in the Philippines, but owing to the vigilance of Father Lopinot, observer at Yap (Western Carolines), who took hourly observations during its passage in that locality, the Manila Observatory was enabled to give timely wærning of danger in the Pacific to China and Japan when the cyclone centre was some 1100 miles distant.

FROM Messrs. C. F. Casella and Co., of 11, Rochester Row, Victoria Street, S.W., we have received a set of the "Stonyhurst Sun Discs" which they have recently issued. These discs have been made at the suggestion, and with the assistance, of Father Cortie, and are similar to those used at Stonyhurst College Observatory for a number of years for the determination of the heliographic positions of sun-spots and faculæ. Each set includes eight discs, and on each of these is a true orthographic projection of the parallels of latitude and longitude corresponding to the value of the declination of the sun's centre, from 0° to ±7°, for each period of the year. The discs are 6 inches in diameter, and are nicely printed on cardboard, for use with a projected image of the sun, or on transparent glazed linen for use with a drawing of the solar disc. Each set is enclosed in a strong cloth wallet, and may be obtained from the above firm at the price of 10*s*. 6*d*. per set.

THE January number of the *Astrophysical Journal* contains a very suggestive article, by Mr. E. Goldstein, of Berlin, on the two-fold line spectra of chemical elements. Mr. Goldstein has found, during a long series of experiments, in which he produced his spectra by employing heavier condenser discharges than have hitherto been employed, that he could replace the well-known spectra of the alkali metals rubidium, cæsium, and potassium by an entirely new line spectrum. Previous workers have found some of the new lines appearing with the arc spectra, but have not succeeded in eliminating the latter; in Mr. Goldstein's spectra, however, the new sets of lines appeared alone. As the lines of the ordinary arc spectra fit themselves into series, whilst the new lines fit into no series, it appears that powerful discharges extinguish all the series lines and replace them by non-series lines in the case of the three metals named. In the case of sodium, Mr. Goldstein has not yet succeeded in eliminating the series lines, only in weakening them, whilst in the case of lithium the effect is still less marked. As the density of the discharge necessary to affect the transformation from the series to the non-series, or "fundamental spectra" ("Grundspectra"), lines appears to increase as the atomic weights decrease, it may be that increased experimental facilities will bring sodium and lithium into line with the other three alkalies. Amongst a number of other important suggestions, reference is made to the possibility of the ordinary, or "series," line spectra being emitted by regular groupings of particles which, when subjected to a heavy condenser discharge such as was employed in the present experiments, are broken up, leaving single particles which emit the single uncorrelated lines of the "fundamental spectra."

THE firm of Gustav Fischer (Jena) has published an address on the modern analysis of psychical phenomena delivered by Prof. A. Hoche at the congress of German Naturalists and Physicians held at Dresden last September. Dr. Hoche, who spoke from a point of view that would exclude all quasi-metaphysical discussion from psychology, characterised the present phase of the science as one of "spade-work" carried out by many hands over a wide area, such as commonly recurs after a period of rapid deepening and widening of our conceptions. Progress has presented itself in the form of new demands upon psychology, followed by the appearance of new methods of investigation and the conception of new aims for its efforts. Under the first of these headings fall the applications of psychology to the scientific study of

history and religion, as well as to matters of legal and medical interest. Among the new modes of investigation are the comparative methods, which have to a great extent taken the place of the older introspection; the experimental method, which commands most attention in the present day; and the pathological method, which, taking advantage of nature's own experiments, has thrown much light on the real character of the contents of some parts of our normal experience. Finally, the newer aims of psychology include the attempts to classify actual personalities with reference to standard equilibrated types, and to find a field for practical applications in pedagogy and in the treatment of criminals.

AT the suggestion of Prof. A. A. Michelson, Mr. L. E. Gurney, of the University of Chicago, has investigated the viscosity of water at very low rates of shear in order to determine whether any change in its value occurs when the motion of the liquid is slight. The water was enclosed between concentric cylinders, the outer one of which was rotated at a measured rate about its axis, while the inner one was prevented from rotating by means of a couple of measured moment. For rates of shear varying from 5 radians down to 0·66 radian per second the author finds no evidence of an increase of viscosity as large as 1 per cent. (*Physical Review*, January).

IN the *Physikalische Zeitschrift* for March 1 Dr. W. Lohmann describes his measurements of the Zeeman effect for the principal lines of helium. The helium tubes were placed in cylindrical holes bored through the pole pieces of the electromagnet in such a way that the electric current through them flowed parallel to the magnetic field. The separation of the outer from the middle lines of the triplets produced was observed by means of an echelon spectroscope. Dr. Lohmann finds that the separation measured on the scale of reciprocal wave-lengths, *i.e.* the quantity $d\lambda/\lambda^2$, where $d\lambda$ is the observed change of the wave-length λ, is the same for the whole of the nine lines of helium observed, and is proportional to the strength of the magnetic field used. He considers this result points to an extremely simple form of helium atom.

PROF. AUGUSTO RIGHI announces the discovery of a new type of rays in the *Rendiconti dei Lincei* for February 2. It was Plücker who first observed that kathode rays, immersed in a strong magnetic field, trace out the magnetic lines of force. This is now held to mean that the projected electrons really describe high-pitched spirals about the lines of force, which nearly coincide with those lines when the field is very strong. Now Prof. Righi has found that these rays do not, as a rule, convey an electric charge. They are therefore not simple kathode rays. They are more probably sets of molecular magnets, constituted by electrons revolving about positive atoms in the planetary fashion. Such systems would possess considerable stability in a magnetic field of the same sign. They would not, of course, carry an electric charge, being themselves neutral combinations, but less close than ordinary chemical combinations. As the field gets weaker, the orbits would open out, and the system would be retarded, and might even return to the kathode. Prof. Righi has found evidences of such return. He proposes the term "magnetic rays" for the new radiation.

A WORK on "Stone: Quarrying and Preparation for the Market," by Mr. A. Greenwell and Mr. J. V. Elsden, will shortly be published by the Chichester Press, Furnival Street, London, E.C.

THE thirty-eighth annual report of the Wellington College Natural Science Society has been received. It deals with the society's work during 1907, and serves to show that the activity of the members is well maintained. A complete meteorological report for the year is included in addition to the proceedings of the society.

THE Royal Swedish Academy of Sciences is publishing a new edition of Swedenborg's scientific works in Swedish and the original Latin. The first volume has appeared, and two others are in the press. These three volumes include Swedenborg's contributions to geology, chemistry, physics, mechanics, and cosmology. Introductions are provided to the various volumes, that to the first by Prof. Alfred G. Nathorst, and those to the second and third by Prof. Svante Arrhenius, while those for forthcoming volumes on anatomy and physiology will be by Profs. Gustaf Retzius and S. E. Henschen respectively. The volumes are being edited by Mr. A. H. Stroh, of Philadelphia, and the price of each volume is 8*s*., payable in advance.

THE general report on the operations of the Survey of India administered under the Government of India during 1905–6 is now available. It has been prepared under the direction of Colonel F. B. Longe, R.E., Surveyor-General of India, and deals with the operations of the department for the survey year ending September 30, 1906. It appears that the total out-turn of detail topographical and forest surveys on all scales was 23,312 square miles, against 26,340 square miles of similar surveys during the previous year, and that no surveys on a smaller scale than 1 inch equal to the mile were carried out during the year. The total area triangulated or traversed for topographical or forest surveys was 27,134, against 19,265 square miles for the previous year. The total area of cadastral and special surveys was 2982 square miles, and the area traversed was 6464 square miles, as compared with 7305 square miles of survey and 6398 square miles of traversing in 1904–5. Among special observations during the year may be mentioned systematic vertical observations of the Himalayan peaks of Kedarnath, Srikanta, Jaunli, Bander Punch, and Nanda Devi from stations near Dehra Dun; if this series of observations can be continued over five or six years the varying effects of refraction and snow-fall will be deducible. Pendulum observations were carried across the plains of the Punjab from Simla to Quetta, and the results have proved that a zone of excessive density crosses the Punjab plains from north to south, underlying Montgomery, Ferozepore, and Mian Mir. The field work of the magnetic survey over different portions of the country has been continued and extended.

OUR ASTRONOMICAL COLUMN.

A POSSIBLY NEW SATELLITE TO JUPITER.—A note in No. 4237 of the *Astronomische Nachrichten* (p. 207, March 6) announces the discovery of a new minor planet, or, possibly, a satellite, near Jupiter. The object was discovered by Mr. P. Melotte on a plate taken by him with the 30-inch equatorial reflector on January 27, and is of the sixteenth magnitude; it has been observed at Greenwich on seven nights since that date, and Prof. Wolf photographed it at Heidelberg on March 3. Should this faint object prove to be a minor planet, its temporary designation will be 1908 CJ, and it will probably prove to be a unique object, as regards its orbit, of its class. But it seems likely—so far as can be judged from the few observations yet made—that it is, really, an eighth member of Jupiter's satellite system, and if this is so it is probably the faintest and most distant yet discovered.